THE EFFECT OF USE OF MULTIPLE REPRESENTATIONS IN SOCIAL SCIENCES CLASS ON THE STUDENTS' ACADEMIC SUCCESS AND ATTITUDES TO THE SOCIAL STUDIES COURSE[i]

Sadullah Üstün[1][ii],
Kadir Karatekin[2]
[1]Erciyes University,
Kayseri, Türkiye
[2]Prof. Dr.,
Kastamonu University,
Kastamonu, Türkiye

Abstract:

The learning environment should support students' interest, desire and attitude towards learning. Qualified learning environments will positively affect students' learning situations. For this reason, teachers should use effective learning/teaching approaches in their lessons in order to enrich learning environments. Especially in the social studies course, where the concepts and knowledge of many disciplines are taught with an interdisciplinary approach, teachers should use effective learning/teaching approaches skillfully. One of the approaches that will increase the level of learning in social studies course is multiple representations. The use of multiple representations is an approach that improves students' mental characteristics and is effective in teaching abstract concepts. The aim of this research is to test the effectiveness of teaching practices supported by multiple representation in the social studies course, which includes many abstract concepts. In this study, a quasi-experimental model with pretest-posttest control group was used. In the research, the effect of teaching using multiple representation in social studies teaching on students' academic achievement and attitudes towards social studies lesson was observed. The sample of the research consists of 40 students studying in the 4th grade of primary school. In order to collect data in the research; "The Place We Live In Achievement Test" developed by the researcher and the "Attitude Scale Towards Social Studies Lesson" developed by Arslan and Şahiner (2010) were used. Before the study, the achievement test and the attitude scale were applied to the experimental and control groups as a pre-test. In the five-week period, the control group, with program-based teaching methods; In the experimental group, the lesson was taught with activities prepared with multiple representations. At the end of the process, a post-test was given

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[ii] Correspondence: email sadullah.ustun@gmail.com

to the experimental and control groups. As a result of the research, it was concluded that the use of multiple representations positively affected the academic success of the students and their attitudes towards the social studies course.

Keywords: social studies, multiple representation, student achievement, attitude

1. Introduction

The learning and teaching process is under the influence of many controlled or uncontrollable variables. For this reason, how effective learning and effective teaching takes place has always been a research topic in educational science. Thanks to the changes and developments in science and technology, it is seen that the approaches, methods, teaching technologies and teaching materials that will facilitate the learning of each individual have also developed. In order to keep up with this change and development, teachers need to integrate innovations in educational science into the learning and teaching processes. Especially in today's world, where an education and training model that is more sensitive to individual differences is generally accepted, this is seen as a necessity. One of the effective approaches for teachers to create a rich learning environment according to the individual differences of their students and to facilitate their learning is multiple representations. Patterson and Norwood (2004, p.5) defined multiple representation as "*describing a concept with the help of equations, tables, and graphs*". Therefore, multi-representation-based teaching is a type of teaching that includes multiple representations of a concept (Çıkla-Akkuş, 2004). When the relevant literature is examined, it is seen that multiple representations are classified as internal and external representations (Ainsworth, 2008; Hubber, Tytler, & Haslam, 2010; Adadan, 2013). Internal representations; mental images can be defined as the model of reality in the mind of the individual, cognitive schemes developed through experiences, or abstractions of mathematical thoughts (Yılmaz, 2016). External representations are; symbolic arrangements such as symbols and diagrams expressed as numbers, algebraic equations, graphs, tables, diagrams, charts, and even words and sentences expressed in written or verbal form (Brenner et al., 1997; Cankoy & Özder, 2011).

Multiple representations are an effective tool for students to construct knowledge. In many studies, it is seen that multiple representations are preferred in the use of conceptual teaching and positive results are obtained (İpek & Okumuş, 2012; İzgiol, 2014; Kaya, 2015). For example, Keller and Hirsch (1998) found in their study that multiple representations provide students with a versatile perspective in understanding concepts in the learning process. Multiple representations provide great convenience to students in interpreting concepts and making sense of them (Kılıç, 2009). In addition, it is seen that the problem-solving success of students who prefer to work with visual representations increases (Delice & Sevimli, 2010; Cankoy & Özder, 2011). Adhering to a single representation in the teaching of a lesson causes the student to look at the subject from a single perspective (Greeno & Hall, 1997). However, each of the multiple representations

emphasizes a different aspect of the concept to be taught. The student, who evaluates the concept from a broader perspective in a teaching environment with different representations, will approach the solutions in different ways in the problem situations he encounters and will choose the most appropriate representation for the solution (Bayık, 2010). Thus, students will better understand their problem situations by experiencing many different ways of thinking or alternative thought patterns (Kartal, 2011; Kaya, 2015). In other words, multiple representations allow students to analyze problems and discover solutions (Can, 2014).

Although the use of multiple representations is a frequently used teaching method in teaching concepts related to mathematics and science, its use in social sciences is not very common (Çetin, 2016). However, multiple representations can be used effectively in teaching the concepts of social sciences. Multiple representations can be used in the social studies course, which is a course in which the knowledge and concepts of many social sciences are used, especially in order to adapt the individual to the social, physical and virtual environment in which he lives. Social studies course also has a wide concept network (Akgün, 2010; Akbulut, 2015). It contains many information, abstract and concrete concepts together. It is known that teachers have some difficulties in teaching these knowledge and concepts to children (Memişoğlu & Tarhan, 2016). Some of these are problems arising from teachers and students, problems arising from textbooks, problems arising from materials and equipment, and problems arising from time (Karasoy, 2004). The intense presence of concepts in social studies teaching and especially the concretization of abstract concepts and the use of concepts such as tables, graphics, pictures, etc. Using representation types (Karasoy, 2004; Göksel, 2007) is important for an effective social studies teaching. Some high-level cognitive skills such as map reading skills, surface area calculations, assimilation of graphical values, table reading and interpretation skills should be developed in the social studies course (Koç, 2008). Because social studies teaching does not only consist of verbal information, but also includes a number of processes including mathematical reading skills (Yanpar, 2004). The fact that teachers prefer only teacher-centered teaching methods in social studies lessons (Atayeter & Tozkoparan, 2014) will prevent the acquisition of these skills. When the literature is examined, it is seen that there are studies on multiple representations in mathematics teaching (Castro, Morcillo, & Castro, 1999; Swafford & Langrall, 2000; Özgün-Koca, 2004; Çıkla-Akkuş, 2004; Sert, 2007; Akkuş & Çakıroğlu, 2009; Kılıç, 2009; Bayık, 2010; Kardeş, 2010; Panusak and Beyranevand, 2010; Yılmaz, 2011; Ergene, 2011; Ural, 2012; İpek and Okumuş, 2012, Özdemir, 2012; Ercan, 2014, Çetin, 2016; Çetin, 2017). No study has been found with the name of direct multiple representation in the teaching of social studies. However, in the field of social studies, reading and preparing graphics (Akgün, 2010; Göksel, 2007), statistics and graphics usage techniques (Akın-Köse, 2011), reading and using maps, graphics and tables (Akar, 2008, Pala, 2011), mind mapping. (Kartal 2011), spatial cognition and map skill (Merç, 2011; Sönmez, 2010) studies have been conducted on multiple representations. At this point, this study, which aims to directly measure the academic achievement and attitudes of students towards the social studies course, is

important in terms of revealing the effectiveness of the use of multiple representations in social studies teaching.

2. Research Problem

- Does using multiple representations in social studies teaching have an effect on students' academic achievement and attitudes towards social studies course?
  Sub Problems:
  1) Do the academic achievement scores of "where we live" unit pre-test show a significant difference according to the group (experiment-control) variable?
  2) Do the academic achievement scores of "where we live" unit pre-test post-test show a significant difference over the experimental group?
  3) Do the academic achievement scores of "where we live" unit pre-test post-test show a significant difference over the control group?
  4) Do the academic achievement scores of "where we live" unit post-test show a significant difference according to the group (experiment-control) variable?
  5) Do the pre-test attitude scores towards the social studies course differ significantly according to the group (experiment-control) variable?
  6) Do the pre-test post-test attitude scores towards the social studies course show a significant difference over the experimental group?
  7) Do the pre-test post-test attitude scores towards the social studies course show a significant difference over the control group?
  8) Do the post-test attitude scores towards the social studies course differ significantly according to the group (experiment-control) variable?

3. Material and Methods

3.1 Model of the Research

In the study, a quasi-experimental design with pre-test, post-test experimental control group, which is one of the quantitative research methods, was used. Experimental designs are defined by Büyüköztürk (2007) as "*research designs used to explore cause-effect relationships between variables*". For this purpose, experimental and control groups were formed by the researcher. Without applying any teaching model to the randomly created experimental and control group, The Unit Evaluation Questions (Achievement Test) of the Classroom Social Studies Lesson and the Attitude Scale towards the Social Studies Lesson were applied as a pre-test. Afterwards, the students in the experimental group were given education by using multiple representations of the subjects included in the "Where We Live Unit" within the scope of the social studies course. Program-based instruction was applied to the control group. As a result of the 5-week application, the control and experimental groups were given "4. Classroom Social Studies Class Unit of Place We Live In Evaluation Questions and Attitude Scale Towards Social Studies Lesson" was applied as a post-test.

3.2 Study Group

Since a quasi-experimental method was preferred in the research process, firstly the experimental and control groups were determined. During the sampling stage, the random sampling method was preferred and two different groups of 20 people were formed. The purpose of using the random sampling method is to determine exactly the effect of the training given in the experimental and control groups and to minimize the variables that will affect the process (Karasar, 2006). The sample of the study consists of 40 4th grade students (from two different classrooms) at the middle level of socio-economic level, who are studying in Kastamonu Province. In addition, during the development of the achievement test within the scope of the study, pilot applications were carried out with 176 randomly selected students from various schools. The participant characteristics for the pilot application are presented in Table 1.

Table 1: Participant information regarding the pilot application

Participant Features		f	%
Gender	Female	73	41,48
	Male	103	58,52
	Total	**176**	**100**

In the pilot study applied during the development of the place where we live unit achievement test, it is seen that 41.48% of the students (n=73) were female, and 58.52% (n=103) were male students. Demographic characteristics for the final application are presented in Table 2.

Table 2: Participant information for final implementation

Participant Features		f	%
Experimental group	Female	8	20
	Male	12	30
Control group	Female	9	22,5
	Male	11	27,5
	Total	**40**	**100**

It is observed that 20% of the participants (n=8) in the experimental group of the successful test of the place unit where we live, which was finalized as a result of the pilot application, consisted of girls (n=12) and 30% of male students, while the participants in the control group (n=9) consisted of girls 22.5% and (n= 11) 27.5% of male students.

3.3 Data Collection Tools of the Research

In the research, "Unit Evaluation Questions (Achievement Test) of the Unit of Place We Live In" and "Attitude Scale Towards Social Studies Lesson" were used. An achievement test consisting of 36 items was developed by the researcher on "Direction finding, geographical features, weather conditions, natural disasters, earthquakes, climate events and human factors" belonging to the "Place Units We Live In" (Üstün, 2019). When the

general reliability level of the achievement test is examined, it is seen that it is 0.96. This value can be considered as a very good value for social sciences (Kline, 1994). Within the scope of the research, the "Attitude Scale Towards Social Studies Lesson", which was developed by Arslan and Şahiner (2010) and whose validity and reliability was ensured, was used in order to measure the effect of education given with multi-representation teaching and program-based teaching system on students' attitudes towards social studies lesson. The said attitude scale was applied to both the experimental group and the control group as a pre-test and post-test.

3.4 Analysis of Research Data

The data collected within the scope of the research were analyzed using the Statistics Program for Social Sciences (SPSS 20.0) and the TAP item analysis program. First of all, item difficulty indices, item discrimination indices, KR-20 reliability coefficients were calculated through the TAP analysis program during the development phase of the achievement test. In the second stage, the data obtained through the achievement test and attitude scale were analyzed. At this point, the pre-test and post-test results of the experimental and control groups were compared with the SPSS 20.0 program, and t-test and one-way analysis of variance (ANOVA) tests were performed for independent samples.

3.5 Procedures for Validity and Reliability Studies

When the studies on the validity of the research are examined;
1) Expert opinion was taken at all stages and the applications were carried out by the researcher himself. Frequent controls were made in order to reduce the faults that may be included in the research process and the process was tried to be kept under control.
2) In order to ensure the content and face validity of the achievement test developed by the researcher, both a table of specifications and expert opinions were taken. At this point, the validity of the achievement test developed has been ensured.
3) Since it is important that the scale intended to be used in the research is valid, a scale that has been previously analyzed and validated was preferred.
   When the studies on the reliability of the research are examined;
1) As in the validity phase, expert opinion was frequently sought during the reliability phase and the process was followed closely.
2) For the developed achievement test, both KR-20 reliability coefficients were determined with the help of TAP analysis program and Cronbach's Alpha Values were calculated with the help of SPSS 20.0.
3) In addition to the reliability studies, 27% sub-group and upper-group averages of each item were calculated and their reliability was ensured.

4. Results and Discussion

4.1 Findings Regarding the First Sub-Problem

Within the scope of the study, "Does the pre-test academic achievement scores of the unit where we live show a significant difference according to the group (experiment-control) variable?" The t-test results for the independent samples for the first sub-problem, expressed as, are presented in Table 3.

Table 3: Results of achievement test pre-test scores according to group variable

	Grup	n	$\overline{X}$	SS	Sd	t	*p*
Group	Experimental	20	13.00	2,384	38	1,104	,277
	Control	20	12.00	3,276			

When Table 3 is examined, the pretest scores of the place unit achievement test of the students in the experimental and control groups [t(38) = 1,104; p>0.05], no significant difference was found. This shows that the students in the experimental and control groups had close knowledge levels before the teaching process started.

4.2 Findings Regarding the Second Sub-Problem

Within the scope of the study, "Does the pre-test post-test academic achievement scores of the unit where we live show a significant difference in favor of the experimental group?" The t-test results for the independent samples for the second sub-problem, expressed as, are presented in Table 4.

Table 4: Experimental group pre-test post-test success score results

Group	Implementation	n	$\overline{X}$	SS	Sd	t	*p*
Experimental	Pre-Test	20	13,00	2,384	38	-6,669	,000
	Post-Test	20	22,00	5,544			

When Table 4 is examined, the place where we live unit achievement test pre-test post-test scores of the students in the experimental group [t(38) = -6,669; p<0.05] a significant difference was found. This shows that the social studies course taught with the help of multiple representations contributed positively to the academic achievement of the students in the experimental group and increased their academic success.

4.3 Findings Regarding the Third Sub-Problem

Within the scope of the study, "Does the pre-test post-test academic achievement scores of the unit where we live show a significant difference in favor of the control group?" The t-test results for the independent samples for the third sub-problem, expressed as, are presented in Table 5.

Table 5: Pretest-posttest success score results of the control group

Group	Implementation	n	$\overline{X}$	SS	Sd	t	p
Control	Pre-Test	20	12,00	3,276	38	-4,065	,000
	Post-Test	20	16,00	2,937			

When Table 5 is examined, the place unit achievement test pretest-posttest scores of the students in the control group are between [t(38) = -4,065; p<0.05] a significant difference was found. This shows that the social studies course taught with the help of program-based teaching contributes positively to the academic success of the students in the control group and increases their academic success.

4.4 Findings Regarding the Fourth Sub-Problem

Within the scope of the study, "Does the post-test academic achievement scores of the unit where we live show a significant difference according to the group (experiment-control) variable?" The t-test results for the independent samples for the fourth sub-problem are presented in Table 6.

Table 6: Results of achievement test post-test scores according to group variable

	Grup	n	$\overline{X}$	SS	Sd	t	p
Group	Experimental	20	22,00	5,544	38	4,277	,000
	Control	20	16,00	2,937			

When Table 6 is examined, the place where we live unit achievement test post-test scores of the students in the experimental and control groups [t(38) = 4.277; p<0.05] a significant difference was found. In both cases, an increase was observed in the academic success of the students in the processes carried out with both multiple representation and program-based teaching. However, when the results of the analysis are examined, it is seen that the students in the experimental group who are educated with the multi-representation approach have higher average success than the students in the control group who receive the program-based education. Therefore, it can be said that the multiple representation approach is more effective than program-based teaching.

4.6 Findings Regarding the Fifth Sub-Problem

Within the scope of the study, "Do the pre-test attitude scores towards the social studies course show a significant difference according to the group (experiment-control) variable?" The t-test results for the independent samples for the fifth sub-problem are presented in Table 7.

Table 7: Results of the attitude scale pre-test scores according to the group variable

	Group	n	$\overline{X}$	SS	Sd	t	p
Group	Experimental	20	43,70	3,49	38	-0,660	0,513
	Control	20	44,60	4,99			

When Table 7 is examined, the social studies course attitude scale pre-test scores of the students in the experimental and control groups [t(38) = -0.660; p>0.05], no significant difference was found. This finding shows that the attitudes of the students in the experimental and control groups towards the social studies course were close to each other before the teaching process started.

4.7 Findings Regarding the Sixth Sub-Problem
Within the scope of the study, "Do the pre-test post-test attitude scores towards the social studies course show a significant difference compared to the experimental group?" The t-test results for the independent samples for the sixth sub-problem are presented in Table 8.

Table 8: Experimental group pre-test post-test attitude score results

Group	Implementation	n	$\underline{X}$	SS	Sd	t	*p*
Experimental	Pre-Test	20	43,70	3,49	38	-13,490	0,000
	Post-Test	20	59,90	4,07			

When Table 8 is examined, the social studies course attitude scale pretest and posttest scores of the students in the experimental group [t(38) = -13,490; p<0.05] a significant difference was found. This shows that the social studies course taught with the help of multiple representations contributed positively to the attitudes of the students in the experimental group.

4.8 Findings Regarding the Seventh Sub-Problem
Within the scope of the study, "Do the pre-test post-test attitude scores towards the social studies course show a significant difference compared to the control group?" The t-test results for the independent samples for the seventh sub-problem are presented in Table 9.

Table 9: The control group pre-test post-test attitude score results

Group	Implementation	n	$\underline{X}$	SS	Sd	t	*p*
Control	Pre-Test	20	44,60	4,99	38	-2,796	0,008
	Post-Test	20	50,95	8,84			

When Table 9 is examined, the social studies course attitude scale pretest-posttest scores of the students in the control group [t(38) = -2,796; p<0.05] a significant difference was found. This finding shows that the social studies course taught with the help of program-based teaching contributes positively to the attitudes of the students in the control group towards the social studies course.

4.9 Findings Regarding the Eighth Sub-Problem

Within the scope of the study, "Do the post-test attitude scores towards the social studies course show a significant difference according to the group (experiment-control) variable?" The t-test results for the independent samples for the eighth sub-problem, expressed as, are presented in Table 10.

Table 10: Results of attitude test post-test scores according to group variable

	Group	n	$\underline{X}$	SS	Sd	t	p
Group	Experimental	20	59,90	4,07	38	4,111	0,000
	Control	20	50,95	8,84			

When Table 10 is examined, the social studies course attitude scale post-test scores of the students in the experimental and control groups [t(38) = 4,111; p<0.05] a significant difference was found. It has been observed that there is an increase in students' attitudes towards the social studies course in both cases in both multiple representation and program-based teaching processes. However, when the results of the analysis are examined, it is seen that the experimental group students who are educated with the multi-representation approach have higher attitudes towards the social studies course than the control group students who receive the program-based education. Therefore, it can be said that the multiple representation approach is more effective in students' attitudes towards the social studies course compared to the curriculum-based teaching.

5. Recommendations

According to the results of the investigation, the following recommendations may be made:

1) It is considered useful to include more multi-representation practices in courses such as "Social Information Teaching, life Information Teaching, Special Teaching methods and Teaching Technologies and Materials Design" in the undergraduate programs of social information teaching and classroom teaching.
2) Teacher candidates should be encouraged to use multiple representations in the "teacher application" course applications.
3) Sample activities prepared with multiple representations should be included on EBA (Education Computing Network)-like platforms.
4) It is thought that it will be beneficial to teach candidates to acquire graphics, animation, video editing, etc. skills in their undergraduate education.
5) Service training activities can be organized by MEB to design activities that include multiple representations for teachers.
6) It is considered useful to include more multi-representation activities in social information textbooks.

6. Conclusion

A significant difference was found between the pretest-posttest scores of the place unit achievement test of the students in the experimental group in which the multiple representation application was applied. This shows that the social studies course taught with the help of multiple representations contributed positively to the academic achievement of the students in the experimental group and increased their academic success. In the related literature, studies in which the multiple representation application is used and the achievement test is preferred to determine it (Akar, 2008; Avşar, 2010; Kaya, 2015) have yielded similar results to the results obtained in this study.

A significant difference was found between the achievement test post-test scores of the students in the experimental and control groups. In both cases, an increase was observed in the academic success of the students in the processes carried out with both multiple representation and program-based teaching. However, when the results of the analysis are examined, it can be said that the average success rate of the experimental group students educated with the multiple representation approach increased more than the control group students educated with the program-based education approach, and that the multiple representation approach is more effective than the program-based education. These results are also supported by the relevant literature (Duman, 1995; Bozanoğlu, 2005; Canbulat, 2014; Hayal, 2015; Bayık, 2016; Çetin, 2016). It has been seen that social studies teaching with multiple representations make significant contributions to increasing the academic success of students. Academic achievement showed a significant increase when compared to the control group in which program-based instruction was given, and this situation; it proves that teaching with multiple representations helps to learn and increases success. Because the use of multiple representations in education supports learning content and positively affects students in learning outcomes and success (Rau, Aleven, Rummel & Pardos (2014). Multiple representations provide great convenience to students in interpreting concepts and making sense of them (Kılıç, 2009). It also contributes to the development of mental activities such as drawing, drawing and dreaming (Pape & Tchoshanov, 2001).

A significant difference was found between the social studies course attitude scale pretest-posttest scores of the students in the experimental group. This shows that the social studies course taught with the help of multiple representations contributed positively to the attitudes of the students in the experimental group and improved the attitudes of the students. In the related literature, it is stated in the studies conducted on the experimental group that the attitude change increases at more significant levels compared to curriculum-based teaching and the teaching model used is more effective (Gökgöz, 2010; İbrahimoğlu, 2010; İzgiol, 2014; Kıcır, 2014).

A significant difference was found between the social studies course attitude scale pretest-posttest scores of the students in the control group. In this case, it can be said that the social studies course taught with the help of program-based teaching contributed positively to the attitudes of the students in the control group and improved their

attitudes. Program-based teaching is a method that is widely used and frequently preferred by teachers (Namal, 2011; Nayci, 2011; Şendil, 2011; Nurses, 2014; Yıldız, 2015). Naturally, it has features that increase student success. However, changing conditions over time, schools, education systems, etc. Due to these factors, traditional teaching methods have lost their function over time and become ineffective (Özkal and Çetingöz, 2006; Panusak and Beyranevand, 2010).

Ordinary learning environments may be insufficient to support students' attitudes and success in the course. In some cases, it is necessary to provide diversity in the learning environment and learning experiences. Uniform, stereotyped methods and habits stand in the way of the effectiveness of education. In a system that offers rich content such as multiple representations and brings different perspectives and alternatives to the subject to be learned, students' interest in the lesson increases and they develop a positive attitude. In this case, it will support the coming of success. Ordinary learning environments may be insufficient to support students' attitudes and success in the course. In some cases, it is necessary to provide diversity in the learning environment and learning experiences. In a system that offers rich content such as multiple representations and brings different perspectives and alternatives to the subject to be learned, students' interest in the lesson increases and they develop a positive attitude.

Attitude has an important effect on increasing school success. In a lesson in which a positive attitude is developed, the student's interest, motivation level and preparation will increase. On the other hand, to attract the attention of the students during the transfer of the course content to the student in order to develop a positive attitude towards the course; It is necessary to direct their attention to the lesson. In order to enable students to develop a positive attitude towards social studies, it is necessary to teach with multiple representations that provide rich content and effective teaching opportunities, offering multiple alternatives in the teaching of the course. In addition to traditional classroom environments, alternative learning environments should be used in social studies teaching, natural environments in the immediate vicinity of the school should benefit, trips to places such as historical artefacts and museums should be organized frequently, and care should be taken to make the trips accompanied by talented and pedagogical guides who know these works well (Yılmaz and Şeker, 2011).

In order to attract students' interest in the lesson, it is essential to benefit from instructional technologies that will visually enrich teaching. In addition, it is necessary to include activities that differ according to the subject in order to enable students to understand that social information comes from life. These activities and course presentation should be in a changing and developing structure that is shaped according to the subject, the characteristics of the learning group, the environment and current situations. On the other hand, it is essential for students to like the lecture presentation and find it interesting. In this case, it is seen that the attitude towards the course and the success of the course are interconnected and jointly acting concepts. If the student likes the lesson and develops a positive attitude, it will provide a support point that facilitates learning. From this point of view, it is seen that social studies teaching with multiple

representations is beneficial and effective in terms of academic success as well as enabling students to develop positive attitudes towards the course.

A significant difference was found between the social studies course attitude scale post-test scores of the students in the experimental and control groups. In both cases, an increase was observed in the attitudes of the students towards the social studies course in both the multi-representation and program-based teaching processes. However, when the results of the analysis are examined, it can be said that the attitudes of the experimental group of students educated with the multi-representation approach have increased more than the control group of students who receive the program-based education, and the multi-representation approach is more effective than the program-based education. These results are also supported by the relevant literature, which was also expressed in previous analysis results.

If the results of the research are generally evaluated, multirepresentation applications are more preferred in areas where mathematics education, physics education, and science education is predominantly available (Bulut, 2010; Karacagil, 2014; Nurses, 2014; Demir, 2017) in social information training, there are no direct multi-representation applications, but studies on map, chart and table reading/preparation skills (Göksel, 2007; Koç, 2008; flows, 2008; Sönmez, 2010; Akgün, 2010; Avsar, 2010; Kartal, 2011; Pala, 2011; Merç, 2011) and these studies are seen to be built on similar foundations.

When studying studies for students in social information training, active learning (Bulut, 2010), learning through invention (Gökgöz, 2010), creative drama (Nayci, 2011), using educational software (Demir, 2017), problem-based learning (Karaca, 2014), visual material usage (Nurses, 2014), internet-based learning (Yaylak, 2010), writing activities (Karacagil, 2014), use of visual materials (Namal, 2011), and the use of teaching models are not often included in multi-representation applications. At this point, this study with the use of multiple representations may be said to fill the gap in the relevant literature.

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Conflict of Interest Statement

There is no dispute or inconsistency. The authors, Sadullah Üstün and Prof. Dr. Kadir Karatekin declare no conflicts of interest.

About the Authors

Sadullah Üstün, Erciyes University Institute of Educational Sciences, Social Studies Education PhD Student, Teacher. Author's fields of work: Social Studies Education, Life Studies Education, International Social Studies Education. The author, who is a doctoral student at Erciyes University Education Faculty, also works as a teacher and continues his research. The author has many articles published in international journals in the field of social studies education. Email: sadullah.ustun@aile.gov.tr, orcid.org/0000-0002-7287-5944.

Prof. Dr. Kadir Karatekin, Kastamonu University, Faculty of Education, Department of Basic Education, Department of Classroom Education, Educational Sciences and Teacher Training Basic Area Basic Education Social Studies Education, Life Studies Education. The author, who is a professor at Kastamonu University, Faculty of Education, Department of Classroom Teaching, continues his research and studies here. The author has many articles, book chapters and papers published in international journals in the field of social studies education. Email: kkaratekin@kastamonu.edu.tr, https://orcid.org/0000-0003-3807-7030.

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